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Application of Computers To Learning in the Command and General Staff College: Assessment of Computer Literacy in CGSC

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A Front End Analysis was conducted regarding the expansion of the use of computers in instruction at the United States Army Command and General Staff College (CGSC). This task, supporting the front end analysis, focused on the assessment of computer literacy in the student, staff, and faculty populations of the CGSC. The results of this survey provide valuable information regarding the pace and sequence of integration of computers into the CGSC curricula. The methodology used here was to construct a questionnaire asking questions regarding an individual's background with computers and to have the evaluation group of the CGSC administer the questionnaire. A total of 696 questionnaires was completed. Major findings were (1) the faculty displayed a lower level of computer literacy than the students, (2) most of those sampled had had some hands-on computer experience, with the most dominant application being word processing, (3) most did not have experience learning via a computer-assisted instruction lesson, and (4) the major field in college did influence the degree of computer literacy.

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18. Continued.

Front End Analysis
Systems Approach to Training
Automated Classroom
Staff Officer
Knowledge, Skills, Abilities
Computer Literacy
Computer Experience

19. Continued.

This report presents the findings and recommendations of Task C-3 of the Front End Analysis. Related reports are separately bound. The reports all have the beginning title, Application of Computers to Learning in the Command and General Staff College. The follow-on headings for the other reports are:

Front End Analysis Study
CGSC Analysis
Analysis of Staff Officer Knowledge, Skills, and Abilities
Assessment of Computers in Education at Various Institutions
Technology Assessment
Analysis of Institutional and Financial Constraints
Army Command and Control Concepts Study
Comparison of Knowledge, Skills, and Abilities to CGSC Learning Objectives
Identification of Computer Opportunities

APPLICATION OF COMPUTERS TO LEARNING IN THE COMMAND AND GENERAL STAFF COLLEGE: ASSESSMENT OF COMPUTER LITERACY IN CGSC

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INTRODUCTION

In any effort involving integration of computers into an instructional setting, a critical element for determining success is literacy. How prepared are the staff and faculty for computers? Are they open to accepting a change in the way instructional materials are prepared, in the structure of classroom activities, or in the means of communication? Are they comfortable with using computers themselves or more comfortable using a computer output someone else has obtained? All of these questions influence the speed and nature of computer integration.

Task C-3 was devoted to assessing the current level of computer literacy among the staff, faculty, and students of the CGSC (Command and General Staff College). The method used to assess literacy was a questionnaire regarding prior use of computers. Responses of students were compared with those of the staff and faculty. Although additional measures would need to be taken to fully assess literacy, this small study does provide an indicator for planning purposes.

TASK DESCRIPTION

Goal

The goal of Task C-3 was to assess the current level of computer literacy in the staff, faculty, and student populations at the CGSC through the administration of a questionnaire.

Relationship of Task C-3 to the Total Project

The results of this task are critical to the overall project in terms of the implementation plan. The level of computer literacy of the various categories of those sampled from the CGSC will impact the sequence and rate of implementation of computers into the curricula.

Experience has shown that in project implementation, a computer software package and hardware configuration can meet the user's requirements and yet fail because of inadequate analysis on how the existing target population would react to introduction of the new change. Therefore, examination of the computer literacy levels of the students will help ensure successful integration of computer applications into the CGSC curriculum.

METHODOLOGY

Hypotheses

Hypothesis C-3-1. CGSC has a higher degree of computer literacy among its students than its faculty.

Hypothesis C-3-2. Most students and faculty of CGSC have used a computer for computer assisted instruction computer-based training.

Hypothesis C-3-3. Most students and faculty of the CGSC have used a computer for word processing.

Hypothesis C-3-4. Most staff and faculty of the CGSC have taken a computer course.

Hypothesis C-3-5. A person's field of study in college (for example, liberal arts and natural sciences) is a significant indicator of his/her computer literacy.

Data Collection Methodology

Prior to isolation of the data collection methodology for this task, the term "computer literacy" needed to be defined. A literature search and references indicated no consensus in definition of the term. Zemke states: "Computer literacy is a true humpty dumpty term, meaning almost anything the person using it wants it to mean...a remarkably wide range of opinion exists about what one must know to be certifiably computer literate" (Zemke, 1983).

Several references credit Art Luehrman of Computer Literacy, Inc., Berkeley, California, for coining the term during the mid-'70s. Luehrman's definition is as follows: "Computer literacy is knowing what a computer can do and then being able to tell the computer what you want it to do for you.

The literature indicates that this term is not specific enough and encompasses programming (which many people dispute). Cushing states: Computer literacy has pretty well established itself as the blanket term for courses and materials that teach beginners how to use, but not necessarily how to program, computers" (Cushing, 1983).

McElwreath (1984) describes the objectives of a computer literacy training course as follows: "Be able to: (1) distinguish between micro, mini, and mainframe computers; (2) describe how a microcomputer could be applied to their own department; (3) use a set of questions and criteria to decide whether a microcomputer is appropriate for their department; and (4) use two popular software packages.

Blau (1985) provides a useful taxonomy for looking at computer literacy:

"Level 1: General orientation. (The user is given definitions of what a computer is functionally capable of doing, along with a glossary of common terms.). . .The majority will have no experience and no need to learn operational skills beyond those necessary to use a touch pad on a simple basic calculator.

"Level 2: Knowledge of and ability to use a program or programs for specific application on a specific system. . . Users here are required to perform such functions as word processing, business accounting applications, accessing databases.

"Level 3: Sufficient knowledge of specific systems and programs to modify and adapt them for extended application with increased productivity. . . . Users at this level. . .may be characterized as computer professionals.

"Level 4: Sufficient in-depth knowledge of system characteristics to develop application software with optimized user and productivity features. . . .People at this level of literacy are capable of writing programs able to take full advantage of system architecture."

These definitions, along with our knowledge of the CGSC, led us to define computer literacy as follows for the purpose of this study:

A person is considered computer literate if they have programmed in any computer language.

This particular definition was selected because one focus of this study is computer applications in the area of collective simulations. The project team has reviewed existing collective simulations and believes that because of the complex user interfaces, a programming background would be required to accurately use and understand the actions occurring within the simulation. As time passes and the new advancements in user interface design are applied to the design of major simulations, the definition of computer literacy for this purpose will become more lenient. Results of the study are, however, discussed in terms of Blau's taxonomy of computer literacy because for personal productivity types of applications, the programming requirement does not exist (Level 2).

Although the literature abounds more with the content of computer literacy courses than it does with measurement instruments, there are many ways to measure a person's level of computer literacy. An optimal methodology is to devise a test that has been shown to be a valid test of computer literacy and then deliver that test to the individuals in that sample. Such a test might consist of the following: Given two new commercial software packages and a personal computer, bring up the packages on the PC (using the documentation) and create two examples of usage of each package within a four-hour period. Such

a test would provide an objective measure of individual performance, but it would be very time consuming and impractical unless there was adequate staffing for such a study.

The methodology chosen here is a subjective measure of computer literacy, based upon asking some questions about an individual's background with computers. This approach is less costly and can more efficiently reach a large number of people than the objective test approach. An even more subjective approach is to ask questions about an individual's opinion regarding one's own computer literacy. This approach was not taken here because of the varying definitions of computer literacy, as well as the fact that humans are not very good at estimating their own capabilities.

The questionnaire used here was compiled based upon knowledge of the literature in the area of computer literacy and upon knowledge of some of the possible background experiences of the sample population (see Appendix A for a blank questionnaire). The questionnaire contained 12 questions, was 1 page in length and asked questions regarding rank, college major, highest degree, experience using and programming computers, and whether a computer course and computer-assisted instruction had been taken.

The questionnaire was sent to the Evaluation Department of the CGSC for administration to the CAS3 and CGSOC staff, to the faculty, and to 141 CAS3 and 151 CGSOC students using a cluster sampling approach of class sections. The questionnaires were administered at CGSC and returned to Los Alamos for compilation.

RESULTS

A total of 696 questionnaires was returned with responses to each question noted in parentheses under each category.

The compiled results are provided in Table Ia-Ie. The percentages shown are based on the total responses to each question. For purpose of clarity, data highlights were depicted in figures and are discussed in the following paragraphs.

TABLE Ia. Questionnaire Analysis - Demographics

Question	Category	Frequencies	Percentage
1."Status" (686)	CAS^3 Students	141	20.6%
	CGSOC Students	151	22.0%
	Staff	96	14.0%
	CAS^3 Faculty	106	15.5%
	CGSOC Faculty	192	28.0%
2."Rank" (696)	COL	8	1.1%
	LTC	166	23.9%
	MAJ	223	32.0%
	CPT	153	22.0%
	WO	2	0.3%
	Enlisted	33	4.7%
	CIV	111	15.9%
3."Education" (691)	Non-College	92	13.3%
	AA	16	2.3%
	BA	90	13.0%
	BS	159	23.0%
	MBA	50	7.2%
	MMAS	4	0.6%
	MS	249	36.0%
	PHD	22	3.2%
	Other	9	1.3%
4."Major" (696)	Liberal Arts	181	26.0%
	Natural Science	108	15.5%
	Social Science	61	8.8%
	Business	189	27.2%
	Other	20	2.9%
	Not Indicated	137	19.7%

TABLE Ib. Questionnaire Analysis - Computer Literacy Questions

Question	Category	Frequency Positive	% of Positive Responses of Identical group	% of Positive Responses to "Question"	% Positive Total Pop (696)
5."Taken a Computer Course?" (360) 51.7%	CAS[3] Students (141)	71	50.4%	19.7%	10.2%
	CGSOC Students (151)	99	65.6%	27.5%	14.2%
	Staff (96)	39	40.6%	10.8%	5.6%
	CAS[3] Faculty (106)	51	48.1%	14.2%	7.3%
	CGSOC Faculty (192)	100	52.1%	27.8%	14.4%
6."Hands-on Experience?" (586) 84.2%	CAS[3] Students (141)	110	78.0%	18.8%	15.8%
	CGSOC Students (151)	139	92.1%	23.7%	20.0%
	Staff (96)	82	85.4%	14.0%	11.8%
	CAS[3] Faculty (106)	90	84.9%	15.4%	12.9%
	CGSOC Faculty (192)	165	85.9%	28.2%	23.7%
7."Used a PC?" (516) 74.1%	CAS[3] Students (141)	93	66.0%	18.0%	13.4%
	CGSOC Students (151)	133	88.1%	25.8%	19.1%
	Staff (96)	60	62.5%	11.6%	8.6%
	CAS[3] Faculty (106)	91	85.8%	17.6%	13.1%
	CGSOC Faculty (192)	139	72.4%	26.9%	20.0%

		Mainframe	Work St	Modem	On-Line	Total Responses	% Positive (883)
8. "Type of Equipment Used?" (883)	CAS[3] Students (141)	49	32	41	14	136	15.4%
	CGSOC Students (151)	84	61	72	31	384	43.5%
	Staff (96)	38	39	45	20	390	44.2%
	CAS[3] Faculty (106)	39	30	41	8	357	40.4%
	CGSOC Faculty (192)	70	69	75	25	381	43.1%
	Total	280	231	274	98	1648	
	(% of Status - 696)	40.2%	33.2%	39.4%	14.1%		

9. "Written Program in -?" (575)

	Frequencies								Percentages (686)			
	Basic	C	Cobol	Pascal	Fortran	Other	Total + Resp.	% + Resp.	Freq. No Dble.	% of + No Dble.	Freq. + High-Lev. Lang.	% + High-Lev. Lang.
CAS[3] Students (141)	50	1	19	9	36	8	123	21.4%	68	48.2%	48	34.0%
CGSOC Students (151)	78	1	12	14	40	7	152	26.4%	94	62.3%	52	34.4%
Staff (96)	27	0	11	9	13	10	70	12.2%	31	32.3%	19	19.8%
Faculty - CAS[3] (106)	38	1	12	2	22	4	79	13.7%	48	45.3%	27	25.5%
Faculty - CGSOC (192)	67	2	20	13	37	12	151	26.3%	77	40.1%	47	24.5%
Total	260	5	74	47	148	41	575		318		193	
(% - 696)	37.4%	0.7%	10.6%	6.8%	21.3%	5.9%	82.6%	46.4%				28.1%

10. "Written Program for Others?" (84) 12.9%

	Freq. + Responses
CAS[3] Students (141)	19
CGSOC Students (151)	25
Staff (96)	12
Faculty - CAS[3] (106)	10
Faculty - CGSOC (192)	24

TABLE Ic. Questionnaire Analysis - Computer Literacy Questions

11. "Used a Computer for - ?"

	CAI	Gaming*	WP	%	Pers. Rcd. Keep'g	Total + Resp.	% + Resp.
CAS^3 Students (141)	48	68	87	61.7%	56	259	18.6%
CGSOC Students (151)	72	90	133	88.1%	95	390	28.0%
Staff (96)	26	31	58	60.4%	27	142	10.2%
Faculty - CAS^3 (106)	47	55	76	71.7%	41	219	15.7%
Faculty - CGSOC (192)	76	88	136	70.8%	83	383	27.5%
Total	269	332	490		302	1393	
(% - 696)	38.6%	47.4%	65.5%		43.4%		

*Gaming in the sense that was interpreted by the respondents includes video and popular computer games.

12. "Do you own a PC?"
(396)
56.9%

	IBM	MAC	TRS 80	Apple	Commodore	Other	Total Resp.	% Total Resp.	No Dble. Resp.	% No Dble.
CAS^3 Students (141)	28	4	4	12	14	9	71	17.9%	60	16.7%
CGSOC Students (151)	37	13	2	37	15	14	118	29.8%	110	30.6%
Staff (96)	7	4	0	9	11	10	41	10.4%	37	10.2%
Faculty - CAS^3 (106)	15	3	2	14	12	2	48	12.1%	46	12.8%
Faculty - CGSOC (192)	26	15	8	26	23	20	118	29.8%	107	29.7%
Total	113	39	16	98	75	55	396		360	
(% - 696)	16.2%	5.6%	2.3%	14.1%	10.8%	7.9%	56.9%		51.7%	

13. Frequency Distribution by Major for "Taken a Computer Course" (Positive Responses)

	Lib Arts	%	Nat Sci	%	Soc Sci	%	Bus	%	Other	%	Total	%
CAS^3 Students (129/141)	50	38.8%	32	24.8%	9	7.0%	34	26.4%	4	3.1%	129	27.9%
CGSOC Students (134/151)	40	29.9%	40	29.9%	10	7.5%	33	24.6%	11	8.2%	134	22.3%
Staff (44/96)	9	20.5%	6	13.6%	7	15.9%	20	45.5%	2	4.5%	44	5.0%
Faculty - CAS^3 (86/106)	26	30.2%	11	12.8%	12	14.0%	37	43.0%	0	0.0%	86	14.5%
Faculty - CGSOC (162/192)	54	33.3%	18	11.1%	23	14.2%	64	39.5%	3	1.9%	162	30.2%
(Percent - Responses)		32.3%		19.3%		11.0%		33.9%		3.6%		100.0%
(Subtotal - Faculty)	80		29		35		101		3		248	83.2%
(Subpercent - Faculty) (248/298)		32.3%		11.7%		14.1%		40.7%		1.2%		100.0%
Total	179		107		61		188		20		555	

14. Frequency Distribution of "Programmed in Any Language" (Positive Responses)

	Lib Arts	%	Nat Sci	%	Soc Sci	%	Bus	%	Other
CAS^3 Students (141)	17	12.1%	21	14.9%	3	2.1%	18	12.8%	2
CGSOC Students (151)	15	9.9%	31	20.5%	8	5.3%	25	16.6%	7
Staff (96)	2	2.1%	5	5.2%	3	3.1%	10	10.4%	1
Faculty - CAS^3 (106)	8	7.5%	11	10.4%	8	7.5%	18	17.0%	0
Faculty - CGSOC (192)	13	6.8%	13	6.8%	9	4.7%	27	14.1%	2
(Subtotal - Faculty) (298)	21	7.0%	24	8.1%	17	5.7%	45	15.1%	2
Total	55		81		31		98		12
(% of 277)		19.9%		29.2%		11.2%		35.4%	

TABLE Id. Questionnaire Analysis - Computer Literacy Questions

Major	Status	Frequency	Programmed In Any Language	%
15. Liberal Arts	CAS[3] Students	50	17	34.0%
	CGSOC Students	40	15	37.5%
	Staff	9	2	22.2%
	Faculty - CAS[3]	26	8	30.8%
	Faculty - CGSOC	54	13	24.1%
	(Subtotal - Faculty)	80	21	26.3%
	Total	179	55	
16. Natural Science	CAS[3] Students	32	21	65.6%
	CGSOC Students	40	31	77.5%
	Staff	6	5	83.3%
	Faculty - CAS[3]	11	11	100.0%
	Faculty - CGSOC	18	13	72.2%
	(Subtotal - Faculty)	29	24	82.8%
	Total	107	81	
17. Social Sciences				
	CAS[3] Students	9	3	33.3%
	CGSOC Students	10	8	80.0%
	Staff	7	3	42.9%
	Faculty - CAS[3]	12	8	66.7%
	Faculty - CGSOC	23	9	39.1%
	(Subtotal) - Faculty)	35	17	48.6%
	Total	61	31	
18. Business				
	CAS[3] Students	34	18	52.9%
	CGSOC Students	33	25	75.8%
	Staff	20	10	50.0%
	Faculty - CAS[3]	37	18	48.6%
	Faculty - CGSOC	64	27	42.2%
	(Subtotal - Faculty)	101	45	44.6%
	Total	188	98	
19. Other				
	CAS[3] Students	4	2	50.0%
	CGSOC Students	11	7	63.6%
	Staff	2	1	50.0%
	Faculty - CAS[3]	0	0	0.0%
	Faculty - CGSOC	3	2	66.7%
	(Subtotal) - Faculty)	3	2	66.7%
	Total	20	12	

In Fig. 1, the level of computer literacy indicated by three of the categories is displayed. These data point out that the most literate group is the CGSOC students and the least literate is the faculty. Within the student population, the CGSOC students are considerably more literate than the CAS3 students. Significantly more students had experience with programming than did the instructors (Chi-square test $p < .005$).

In Fig. 2, one can see that the percentages of those sampled who have had hands-on computer experience (mean = 84.2%) and those who have had word processing experience (mean = 71.4%) are very high. Thus, one can observe that the degree of preparedness for personal productivity types of applications is quite good compared to the degree of preparedness for major simulations.

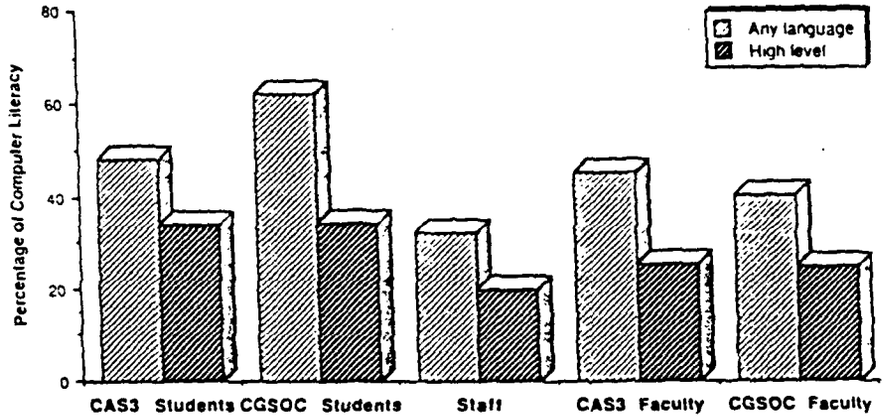

Fig. 1. Computer literacy (defined as programmed in any language and in any language except BASIC).

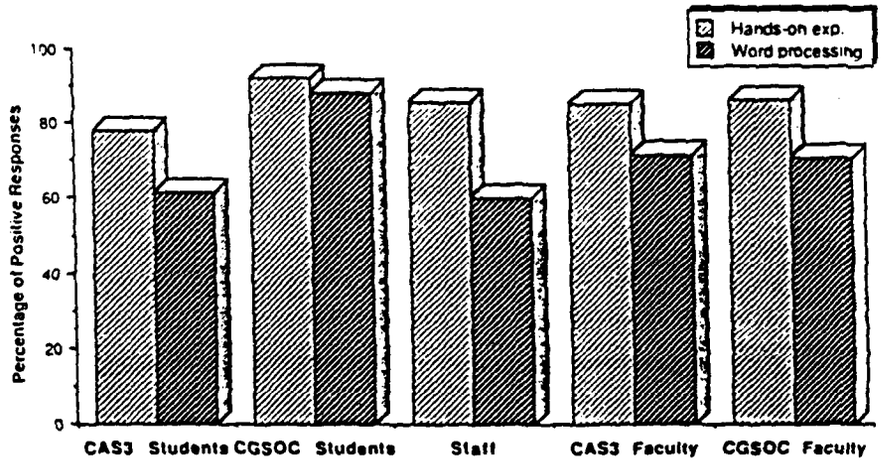

Fig. 2. Percentages of those sampled who had hands-on computer experience (mean = 84.2%) and word processing experience (mean = 71.4%).

Figure 3 displays the percentage of people who have taken a computer course from each of the categories sampled. Note that these figures are higher than the figures for computer literacy, indicating that many of these hands-on computer courses did not require the writing of a program and were probably applications courses (that is, how to use a particular commercial package).

One of the principle computer applications in education is computer-based training/computer-assisted instruction. In this area, the degree of prior experience among both students and faculty was very low (mean = 39.2%), with no significant differences between the prior experience of students and faculty (as determined by the Chi-square test for differences is probability). (See Fig. 4).

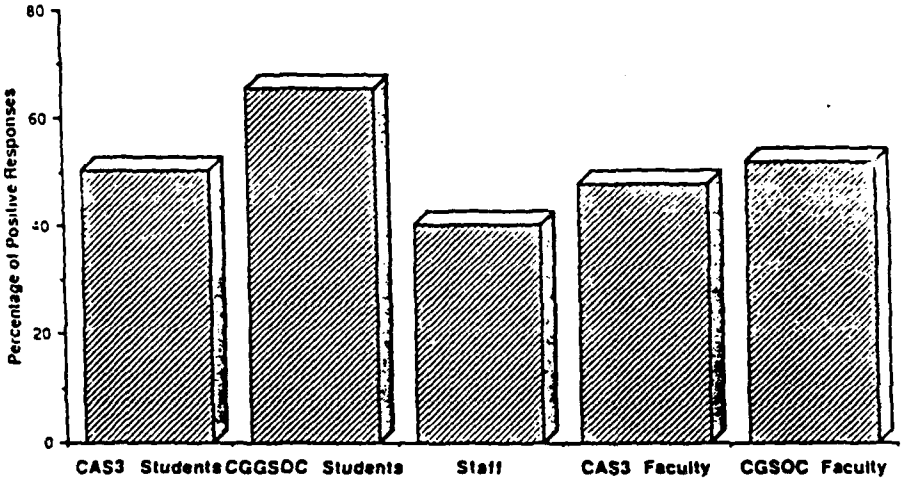

Fig. 3. Percentages of those sampled who have taken a computer course (mean = 51.7%).

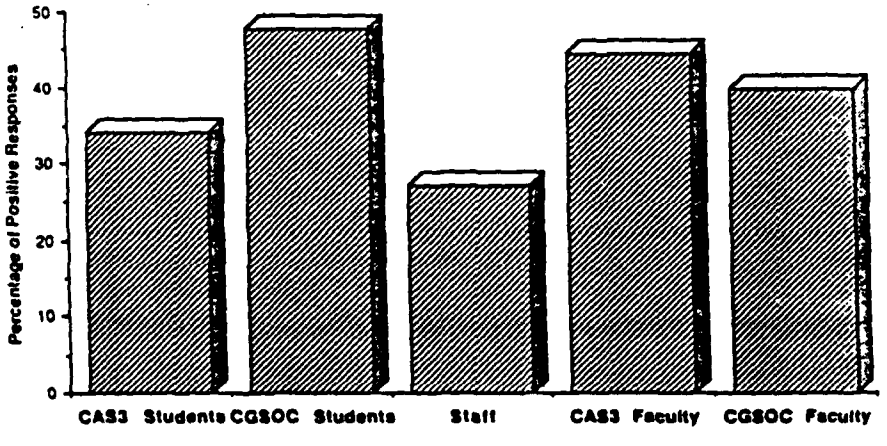

Fig. 4. Percentages of those sampled who have used a computer for computer-assisted instruction (mean = 39.2%).

The probability a person will use a personal computer frequently is related to the ease-of-access to the hardware. One cannot necessarily conclude, however, that just because a person has easy access to a personal computer that one uses it frequently. The project team asked if the respondents owned a personal computer, and more than half did (mean = 51.7%)(see Fig. 5). The CGSOC students and faculty were most likely to own a personal computer, followed by the CAS3 students and faculty.

In Fig. 6, one can observe that the degree of computer literacy is affected by one's major field of study in college. For the sake of analysis, the major fields of study have been divided into four main categories and "other." These data allow us to accept the hypothesis that a person's field of study in college is a significant indicator of computer literacy (Hypothesis C-3-5)(Chi-square test for goodness of fit, $p < .001$). Within the different majors, there is the greatest degree of literacy in the natural sciences area, followed by social science and business.

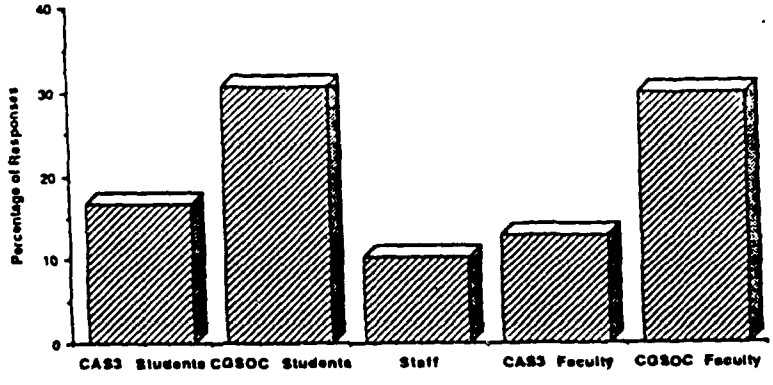

Fig. 5. Percentages of those sampled who own a personal computer (mean = 51.7%).

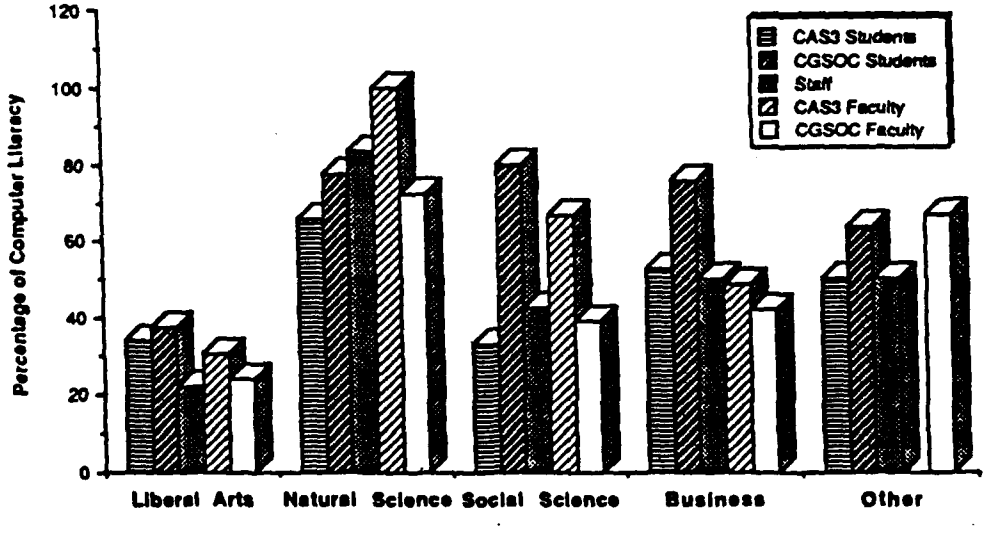

Fig. 6. Computer literacy (as defined by programmed in any language) vs major field of study.

There is a large drop off of respondents who only had programmed in BASIC. This phenomenon was especially marked in the CGSOC students who were social science majors. The percentages for the various fields of study from the staff, faculty, and students are provided in Table II.

TABLE II. Computer Literacy vs Major Field of Study
(N = 555, Frequencies and Percentages Provided)

Status	Liberal Arts	%	Natural Science	%	Social Science	%	Business	%	Other	%
Faculty	80	32.3	29	11.7	35	14.1	11	40.7	3	1.2
CAS[3] Students	50	38.8	32	24.8	9	7.0	34	26.4	4	3.1
CGSC Students	40	29.9	40	29.9	10	7.5	33	24.6	11	8.2
Staff	9	20.5	6	13.6	7	15.9	20	45.5	2	4.5
Total	179		107		61		188		20	
Mean		32%		16.9%		12.0%		36.0%		4%

Returning to the original hypotheses for Task C-3, the data have indicated the following:

Hypothesis C-3-1. CGSC has a higher degree of computer literacy among its students than its faculty.

Conclusion. ACCEPT (Chi square test, $p < .005$).

CGSC has a higher degree of computer literacy among its students than its faculty (55% vs. 41%) with computer literacy defined here as experience with programming in a high-level language.

Hypothesis C-3-2. Most students and faculty of CGSC have used a computer for computer assisted instruction or computer-based training.

Conclusion. REJECT (Binominal test).

59% of students and faculty of CGSC have not used a computer for computer-assisted instruction/computer-based training.

Hypothesis C-3-3. Most students and faculty of the CGSC have used a computer for word processing.

Conclusion. ACCEPT (Binominal test, $p < .0001$).

73% of students and faculty of the CGSC have used a computer for word processing.

Hypothesis C-3-4. Most staff and faculty of the CGSC have taken a computer course.

Conclusion. REJECT (Binominal test).

52% of staff and faculty of the CGSC have not taken a computer course.

Hypothesis C-2-5. A person's field of study in college is a significant indicator of computer literacy.

Conclusion. ACCEPT (Chi square test, $p < .001$).

76% of persons with natural science majors had experience with programming as compared to 31% of liberal arts majors with experience.

DISCUSSION

The major findings of Task C-3 were the following:

- Following the definition of computer literacy as used here, the faculty displayed a lower level of literacy than the students. Therefore, before existing major simulations are implemented in the CGSC, the level of computer literacy must rise among the faculty.

- The most frequently used computer application among those people sampled was word processing; and most of the population sampled had had some hands-on computer experience, suggesting that the faculty, staff and students could become frequent users of personal productivity software (for example, word processors) without a significant anxiety impact.

- Most of those sampled did not have experience using computer-assisted instruction. CAI or CBT (computer-assisted instruction or computer-based training) applications have been available in the schools and institutions of higher education for over two decades; thus, one might expect the percentage to be higher. These data are encouraging in the sense that there are many CGSC faculty and staff with no preconceived notion of the degree of worth of CAI or CBT. On the other hand, the same degree of anxiety will need to be expected in the implementation of CAI or CBT.

- The area of major field of study did impact the degree of computer literacy in the faculty and students. As the trend continues of the Army's attracting more liberal arts students and fewer science majors, the impact on the need to have the CGSC provide computer literacy screening and training for faculty is clear.

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APPENDIX A
GENERAL COMPUTER QUESTIONNAIRE

1. What is your staff position or position at school? Check one.
   ___ CAS3 Students
   ___ CGSOC Student
   ___ Other Faculty
   ___ CGSOC Faculty
   ___ CAS3 Faculty

2. What is your rank? Check one.

___ COL	___ 1LT	___ SFC/PSG	___ PFC
___ LTC	___ 2LT	___ SSG	___ PVT
___ MAJ	___ SGM	___ SGT	___ CIV
___ CPT	___ MSGT	___ CPL/SP4	

3. a. What is your highest level of education? Check one.
   ___ BS ___ MMAS ___ AA ___ BA ___ MBA
   ___ MS ___ PHD ___ noncollege graduate
   b. What was your major? _____

4. a. Have you ever taken a hands-on computer science course? YES NO
   b. Have you ever had hands-on experience with a computer? YES NO

5. Have you ever?
   ___ used a PC
   ___ used a mainframe (for example, VAX, DEC, CDC, IBM)
   ___ used a workstation (for example, SUN, APOLLO, IBMRT)
   ___ used a modem
   ___ used on-line service (for example, Dow Jones, Compuserv, Source)
   ___ written a program for yourself
      ___ in BASIC ___ in PASCAL
      ___ In C-3 ___ in FORTRAN
      ___ in COBOL ___ other _____
   ___ written a program for someone else to use
   ___ used computer-aided instruction
   ___ used a computer for
   ___ gaming ___ word processing
   ___ personal record keeping

6. Do you own your own computer? YES NO
   If yes, what type?
   ___ IBM PC or IBM clone ___ Apple II, IIe
   ___ Apple Macintosh ___ Commodore
   ___ TRS80 ___ other _____